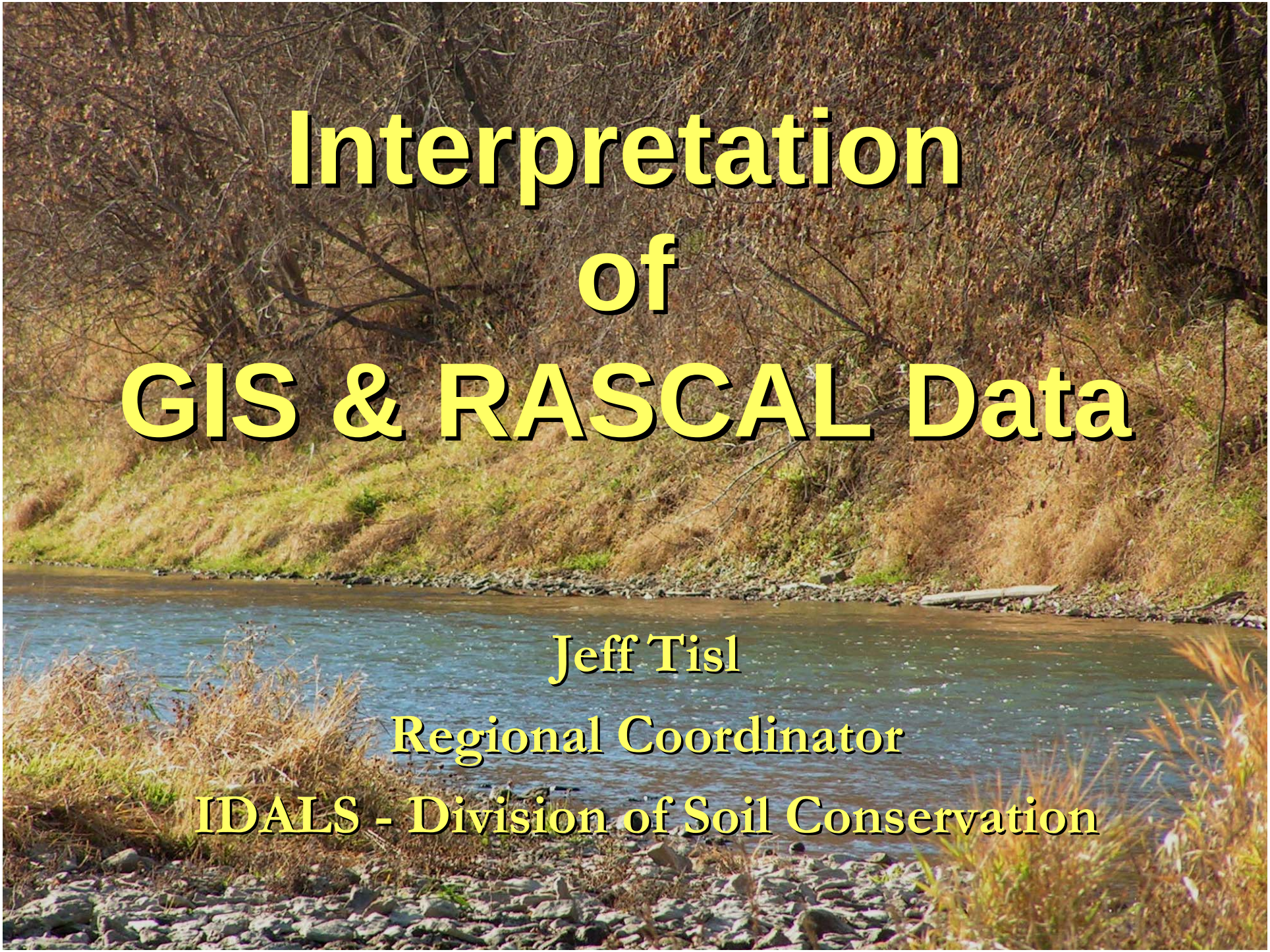
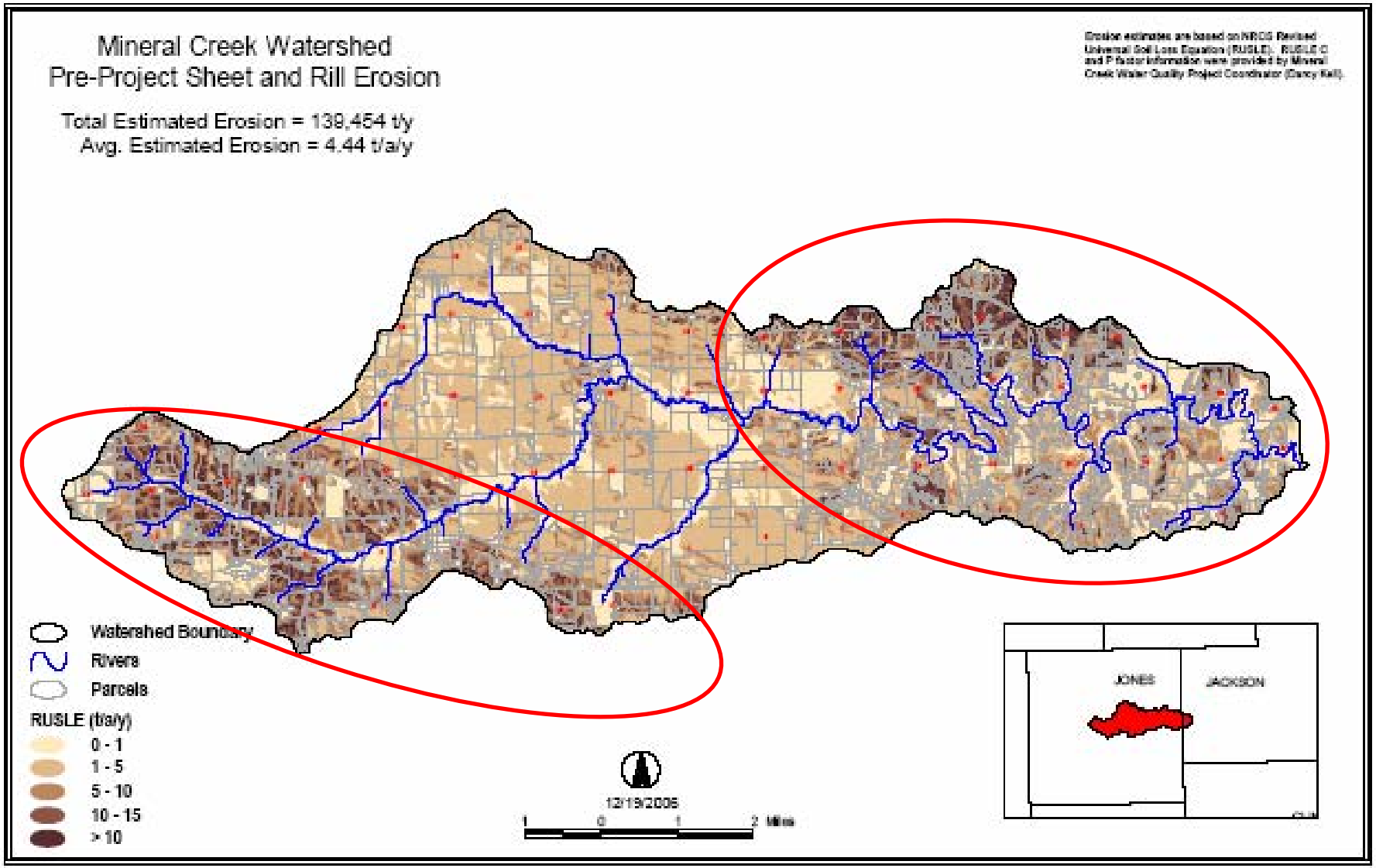

Interpretation
of
GIS & RASCAL Data
Jeff Tisl
Regional Coordinator
IDALS - Division of Soil Conservation

GIS as a Watershed Planning Tool

- Effective way to gather and process detailed data
- Effective way to interface with the public
  - Basic water quality education
  - Detailed project-related findings
- Planning and the identification of Priority Areas
- Reporting Tool

Identification of Priority Areas



Identification of Priority Areas

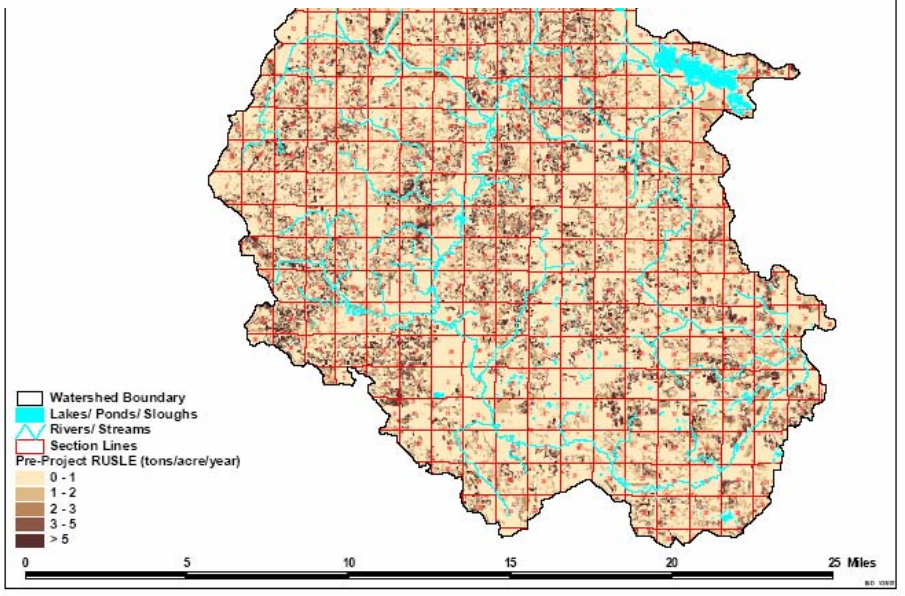
Pre-Project Winnebago River Watershed (229,161 acres)
Estimated Sheet and Rill Erosion (RUSLE)

Minnesota Portion (45,606 acres)

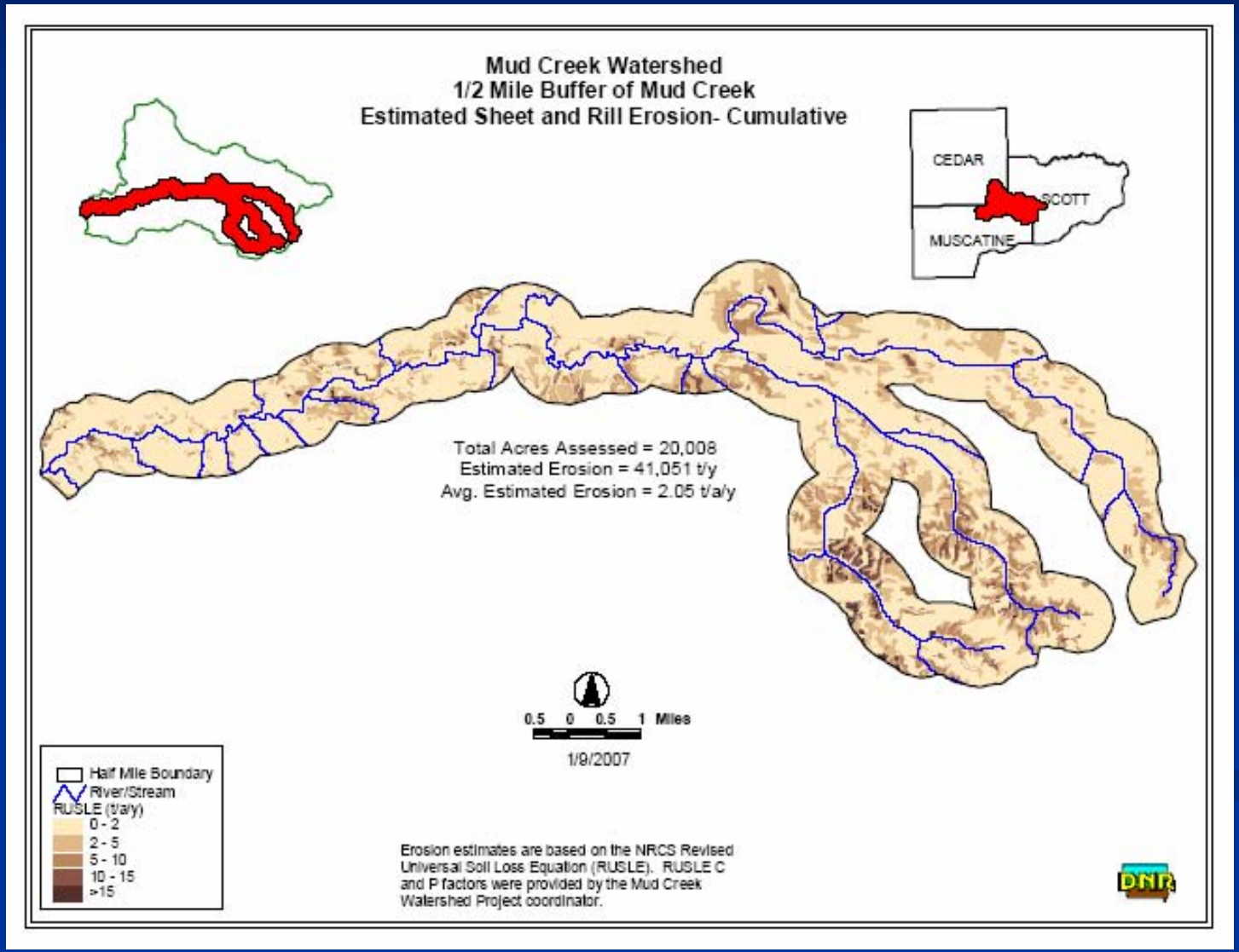
Total Estimated Erosion = 37,797 tons/year
Average Estimated Erosion = 0.83 tons/acre/year

Iowa Portion (183,555 acres)

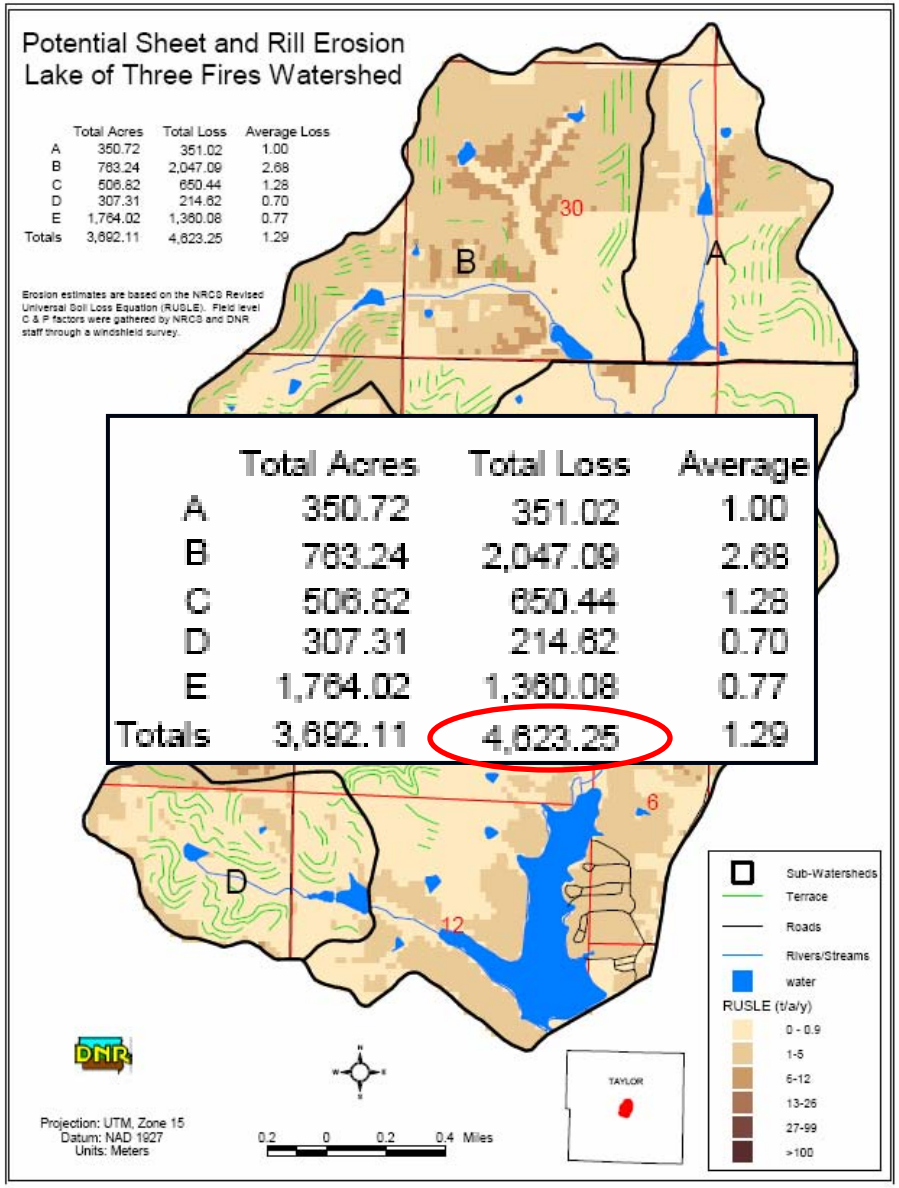
Total Estimated Erosion = 252,869 tons/year
Average Estimated Erosion = 1.38 tons/acre/year

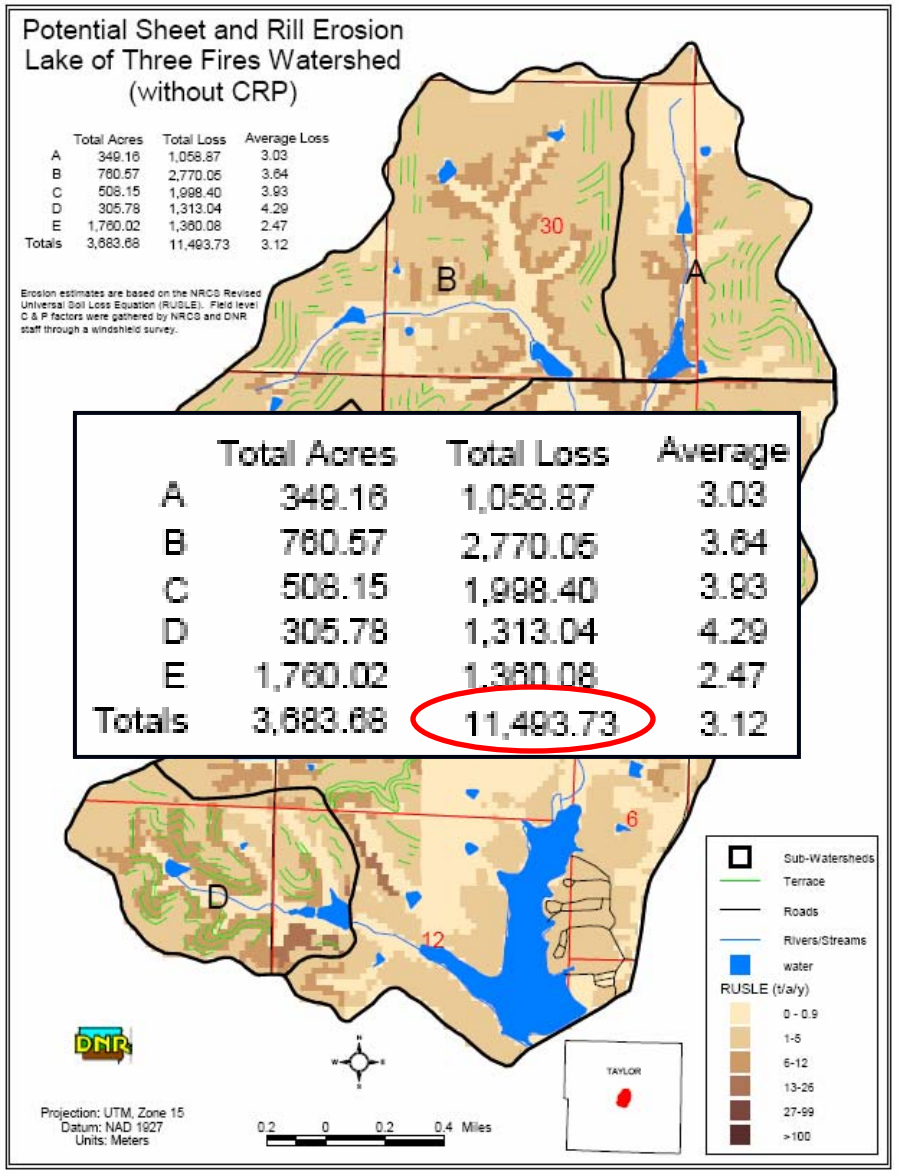


Identification of Priority Areas

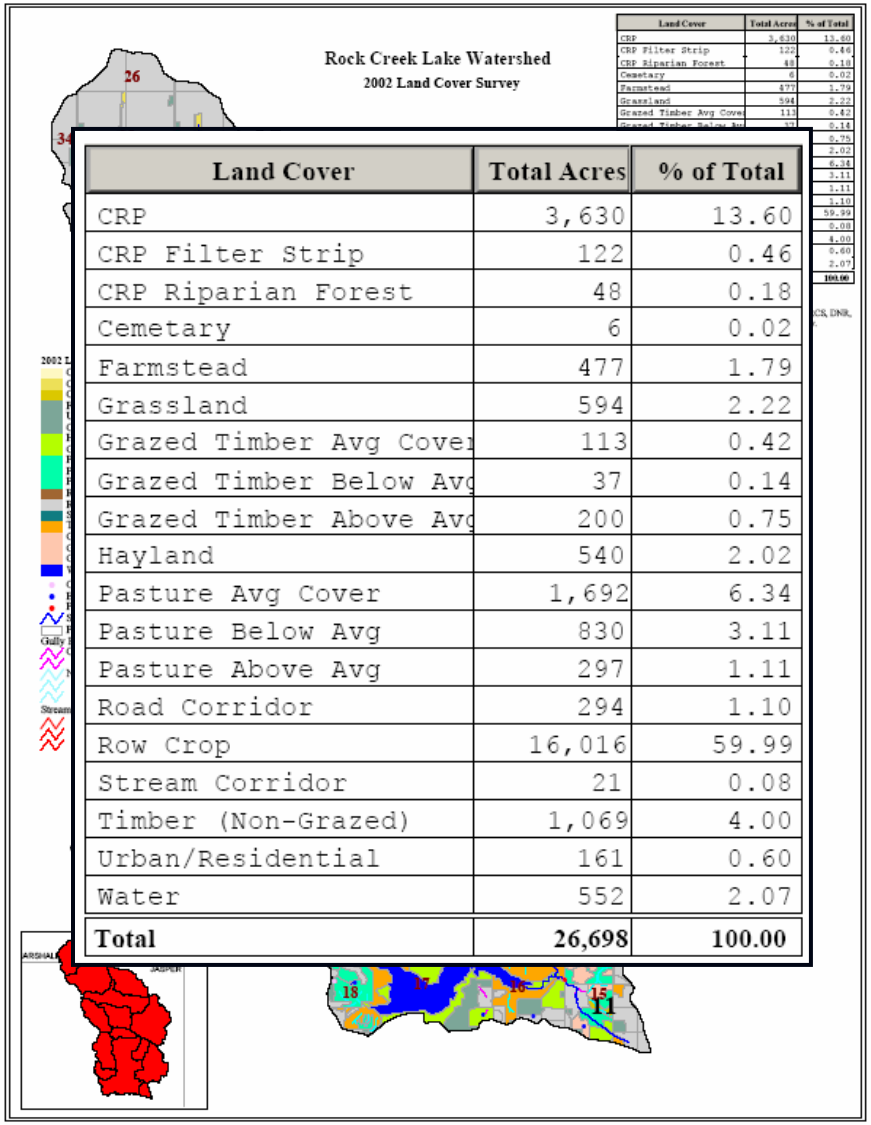


Projecting Land Use Changes

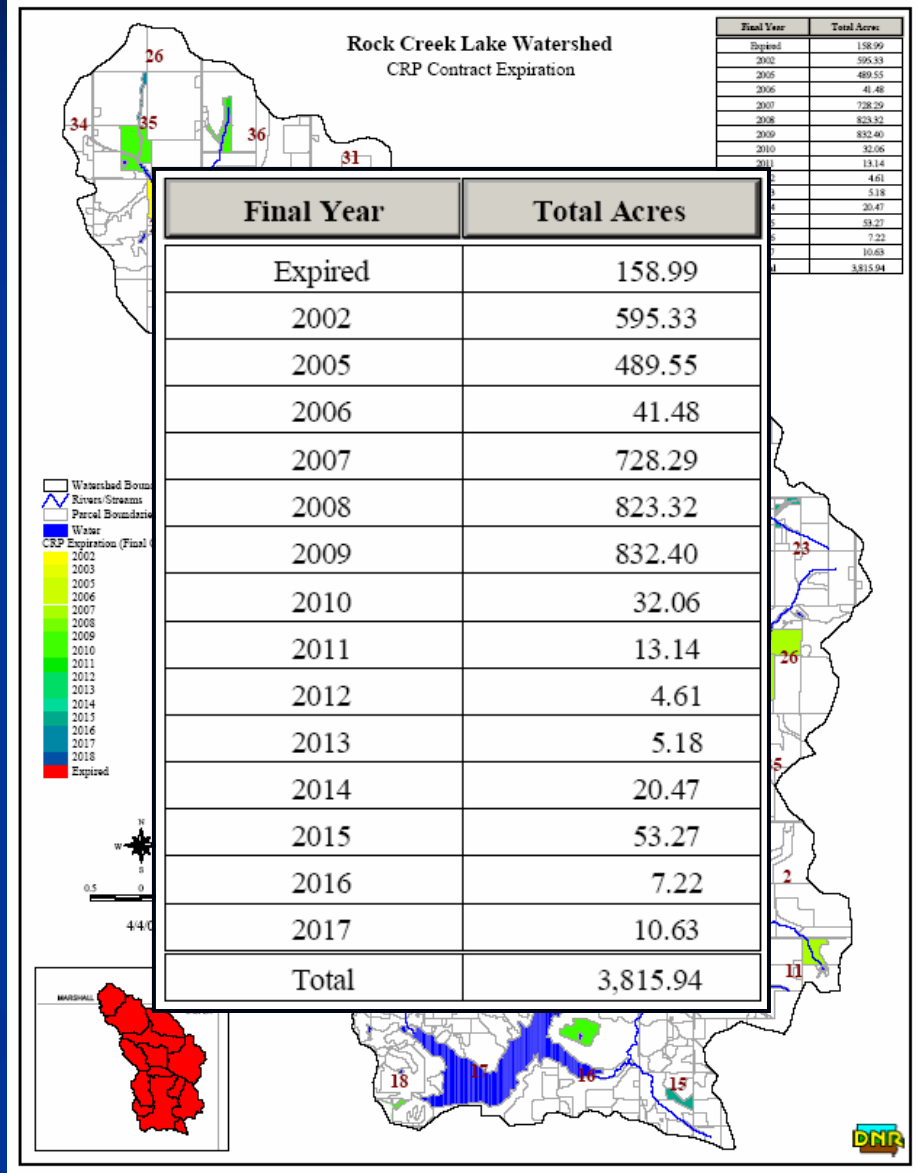




Land Cover Assessments

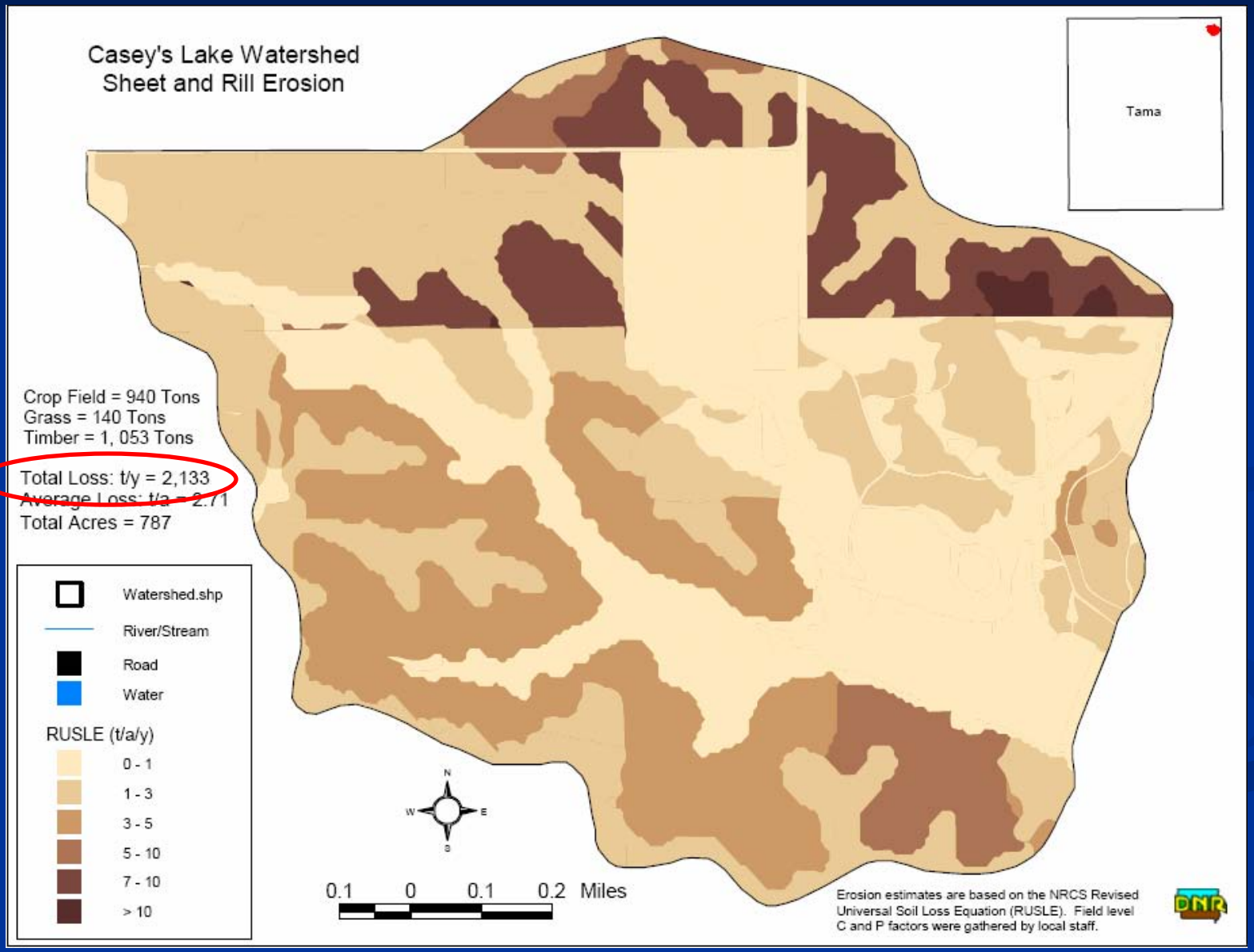


Land Cover	Total Acres	% of Total
CRP	3,630	13.60
CRP Filter Strip	122	0.46
CRP Riparian Forest	48	0.18
Cemetary	6	0.02
Farmstead	477	1.79
Grassland	594	2.22
Grazed Timber Avg Cover	113	0.42
Grazed Timber Below Avg	37	0.14
Grazed Timber Above Avg	200	0.75
Hayland	540	2.02
Pasture Avg Cover	1,692	6.34
Pasture Below Avg	830	3.11
Pasture Above Avg	297	1.11
Road Corridor	294	1.10
Row Crop	16,016	59.99
Stream Corridor	21	0.08
Timber (Non-Grazed)	1,069	4.00
Urban/Residential	161	0.60
Water	552	2.07
Total	**26,698**	**100.00**

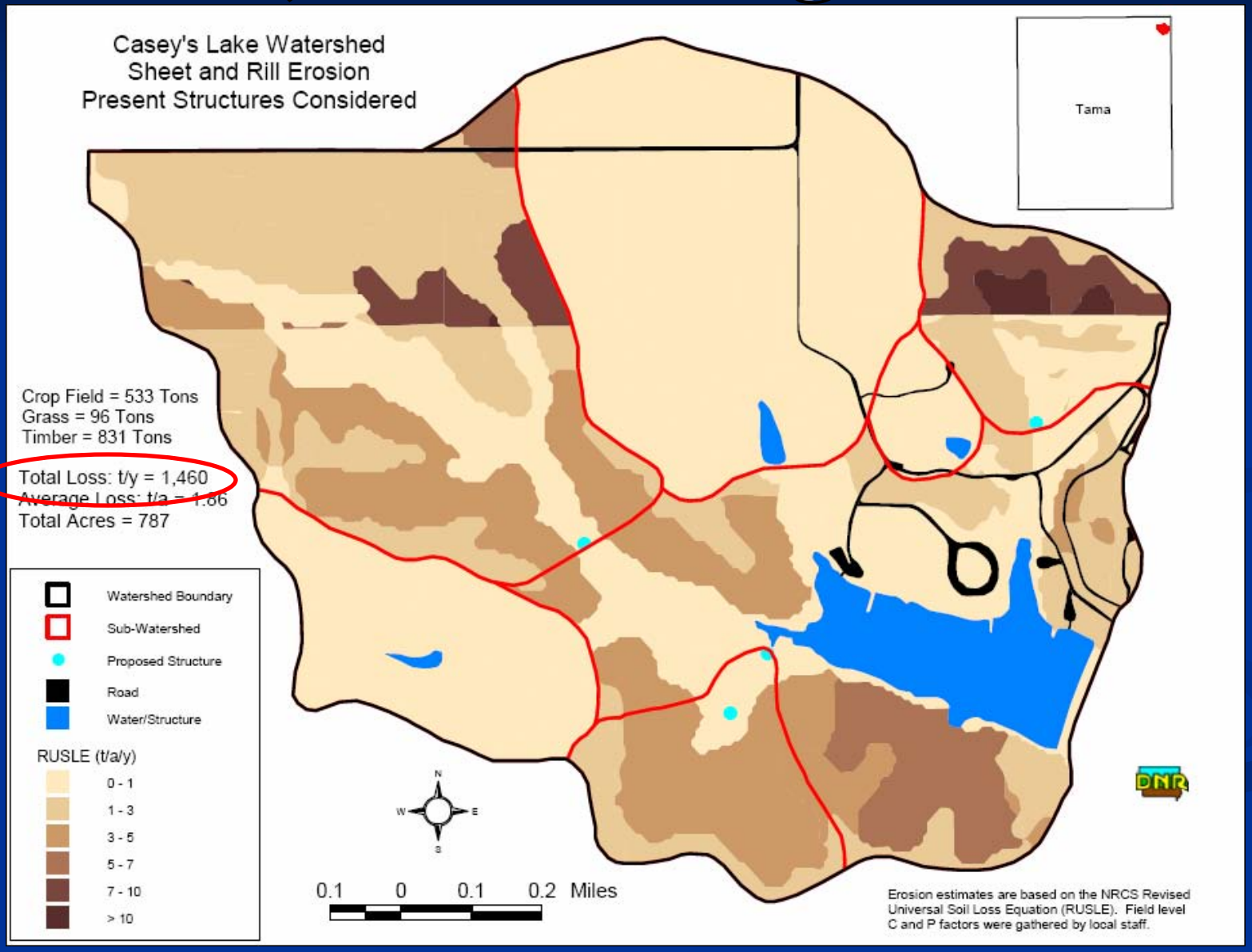


Final Year	Total Acres
Expired	158.99
2002	595.33
2005	489.55
2006	41.48
2007	728.29
2008	823.32
2009	832.40
2010	32.06
2011	13.14
2012	4.61
2013	5.18
2014	20.47
2015	53.27
2016	7.22
2017	10.63
Total	3,815.94

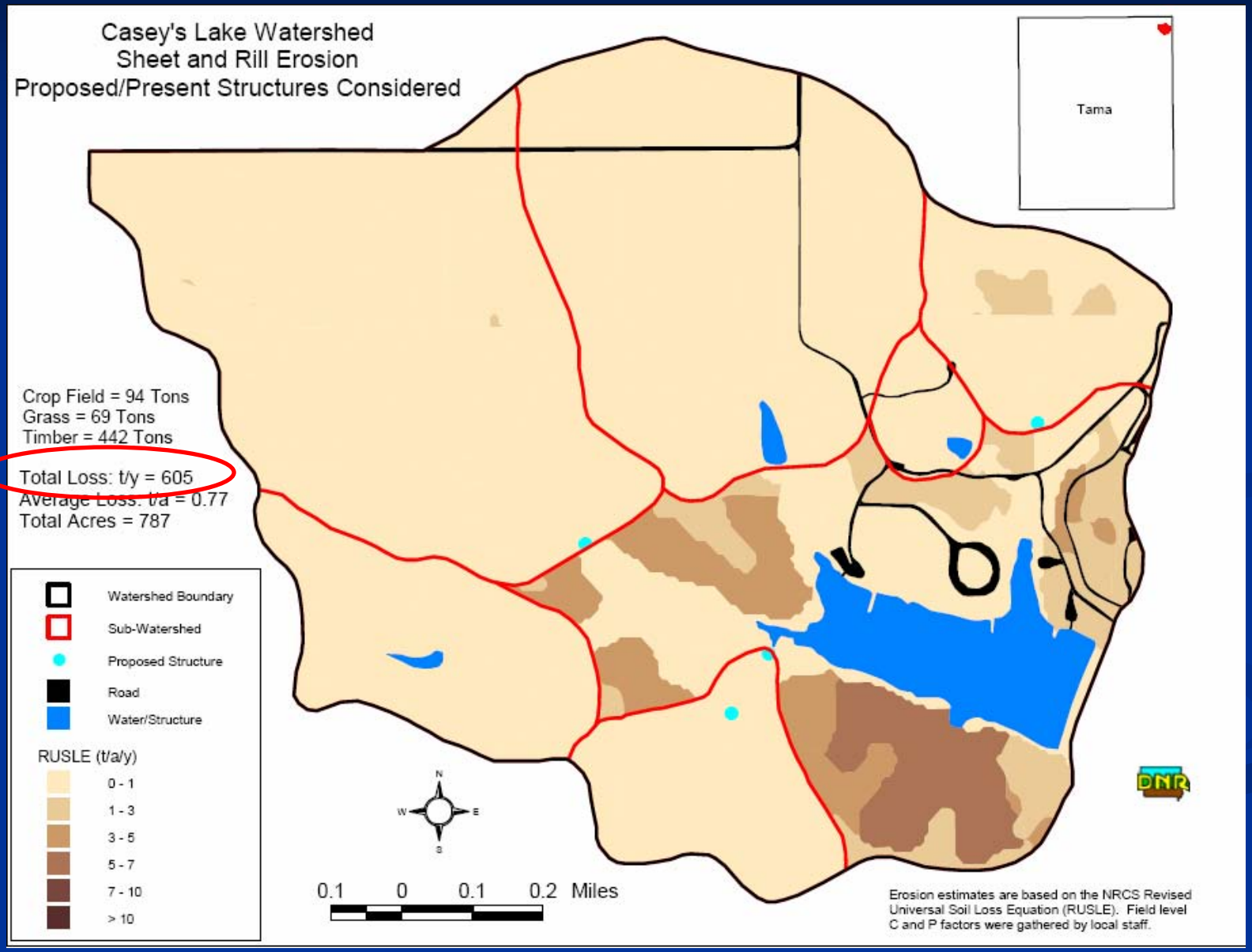
Pre-Project RUSLE - No Structures



Pre-Project - Existing Structures



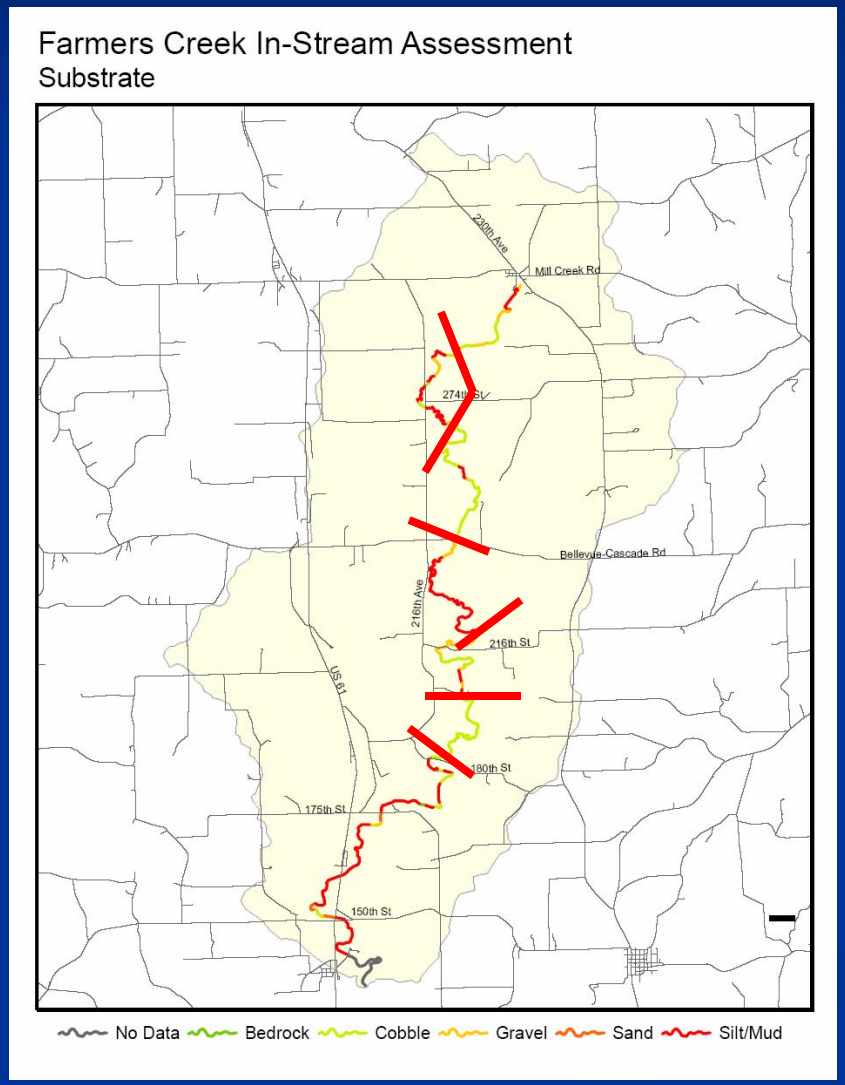
Post-Project - Additional Structures

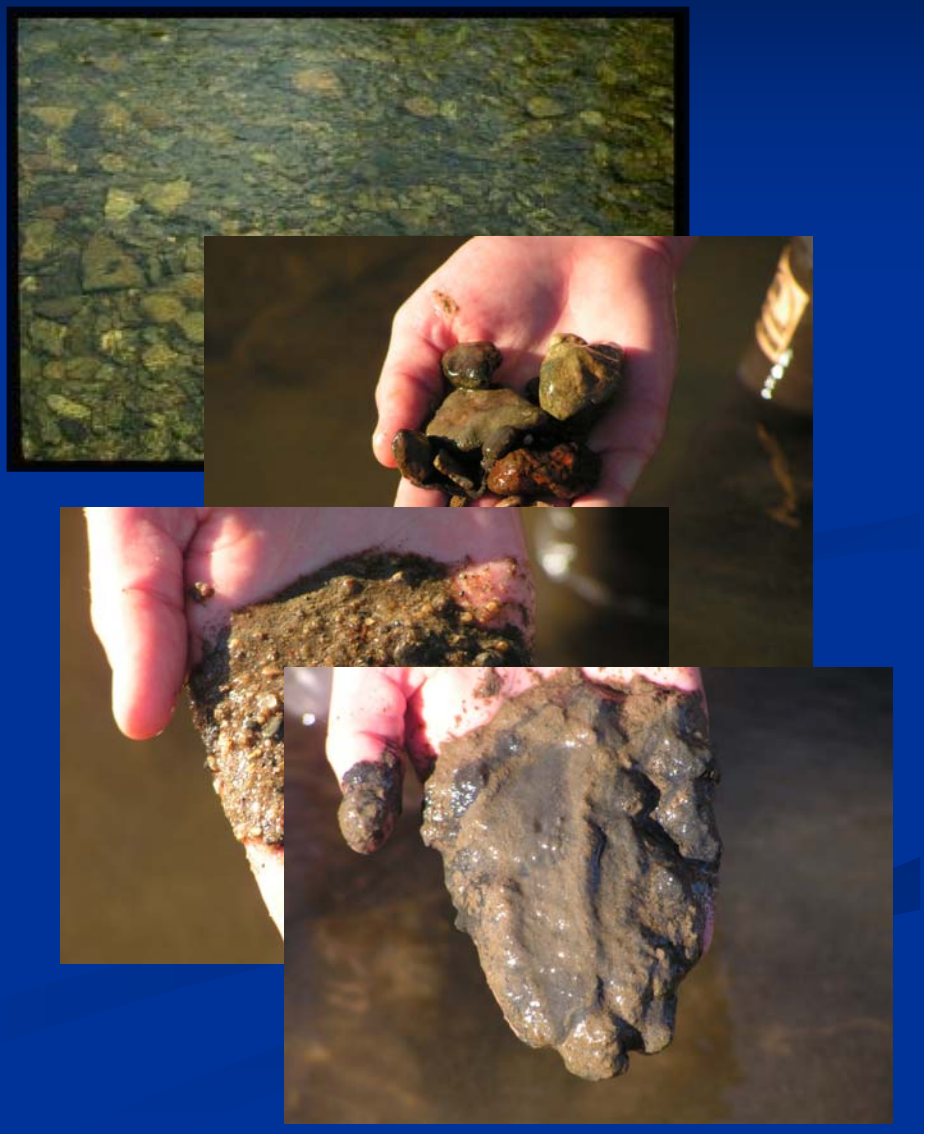


RASCAL Assessments

- **Pre-Survey**
  - Establishment of local Advisory Group
  - Identification/ranking of priority water quality issues
  - Send out letters to landowners
  - Secure equipment
- **Survey**
  - Receive training
  - Respect landowners rights
  - Ensure personal safety
- **Post-Survey**
  - Identify all physiologic & land use breaks
  - Compare adjacent segments and combine
  - Combine data for final segments with GIS data
  - Describe on-going water quality threats by segment

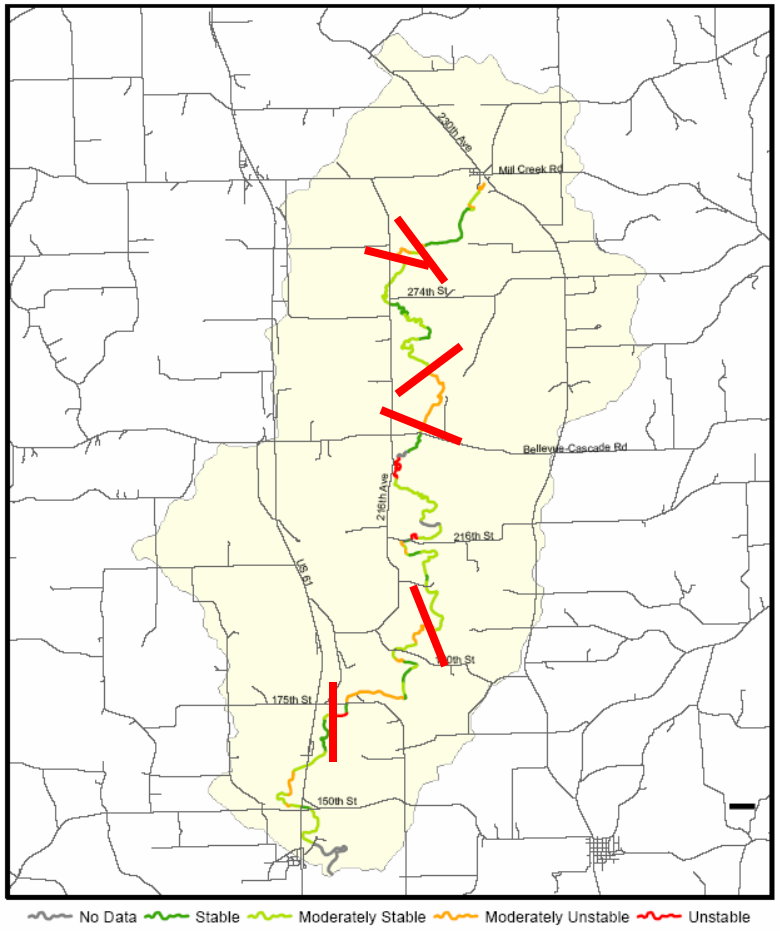
RASCAL Case Study



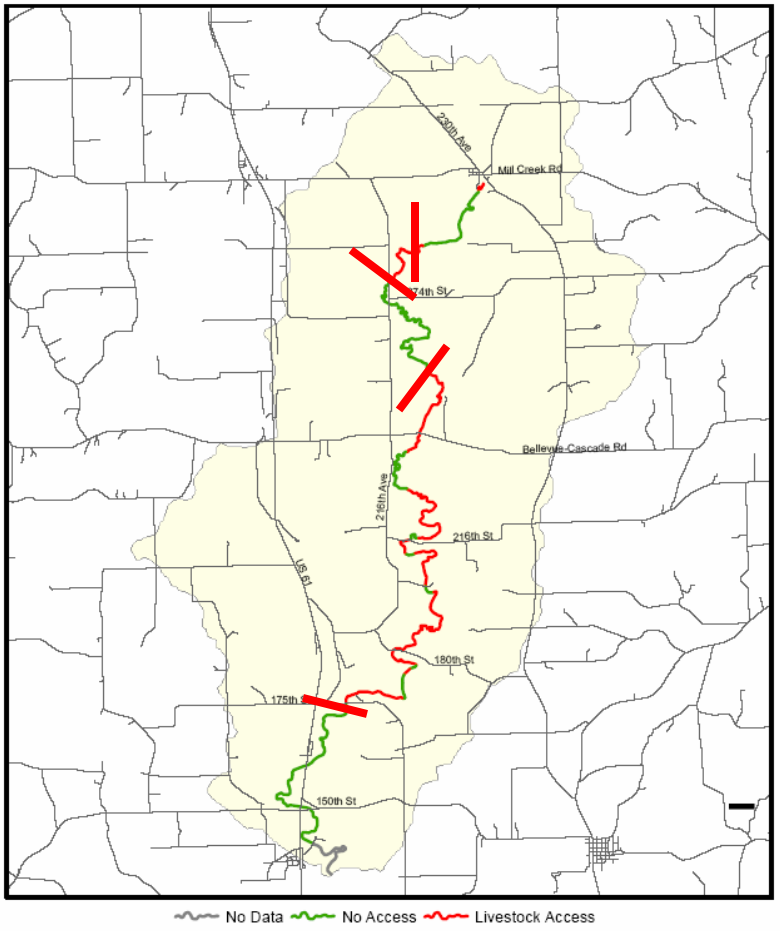


RASCAL Case Study

Farmers Creek In-Stream Assessment
Bank Stability

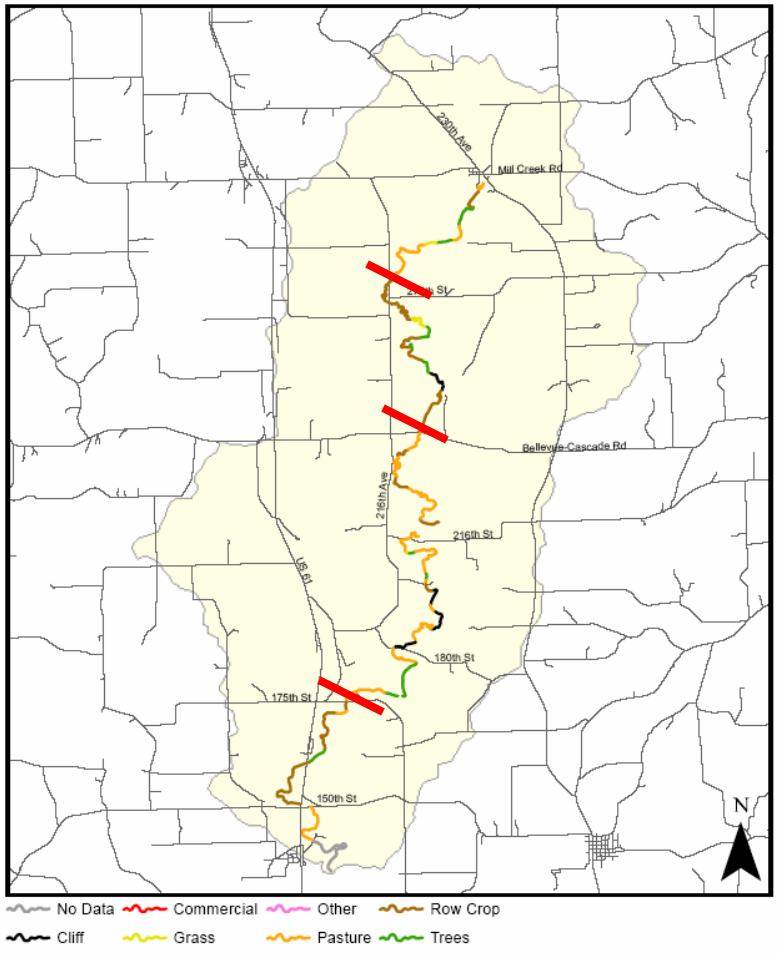


Farmers Creek In-Stream Assessment
Livestock Access

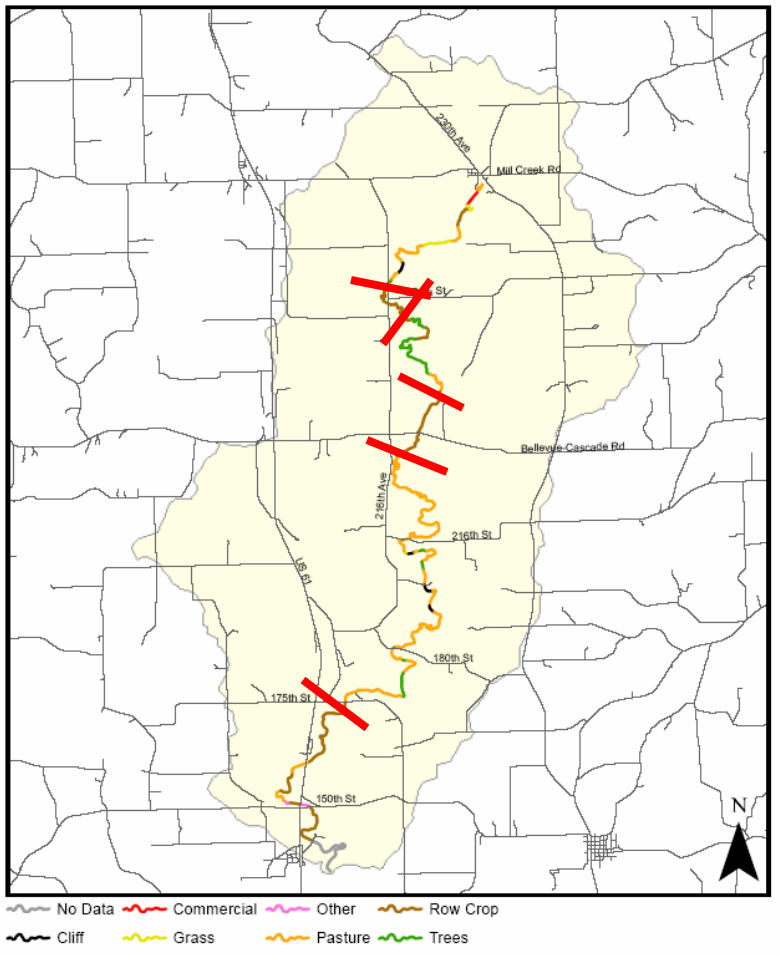


RASCAL Case Study

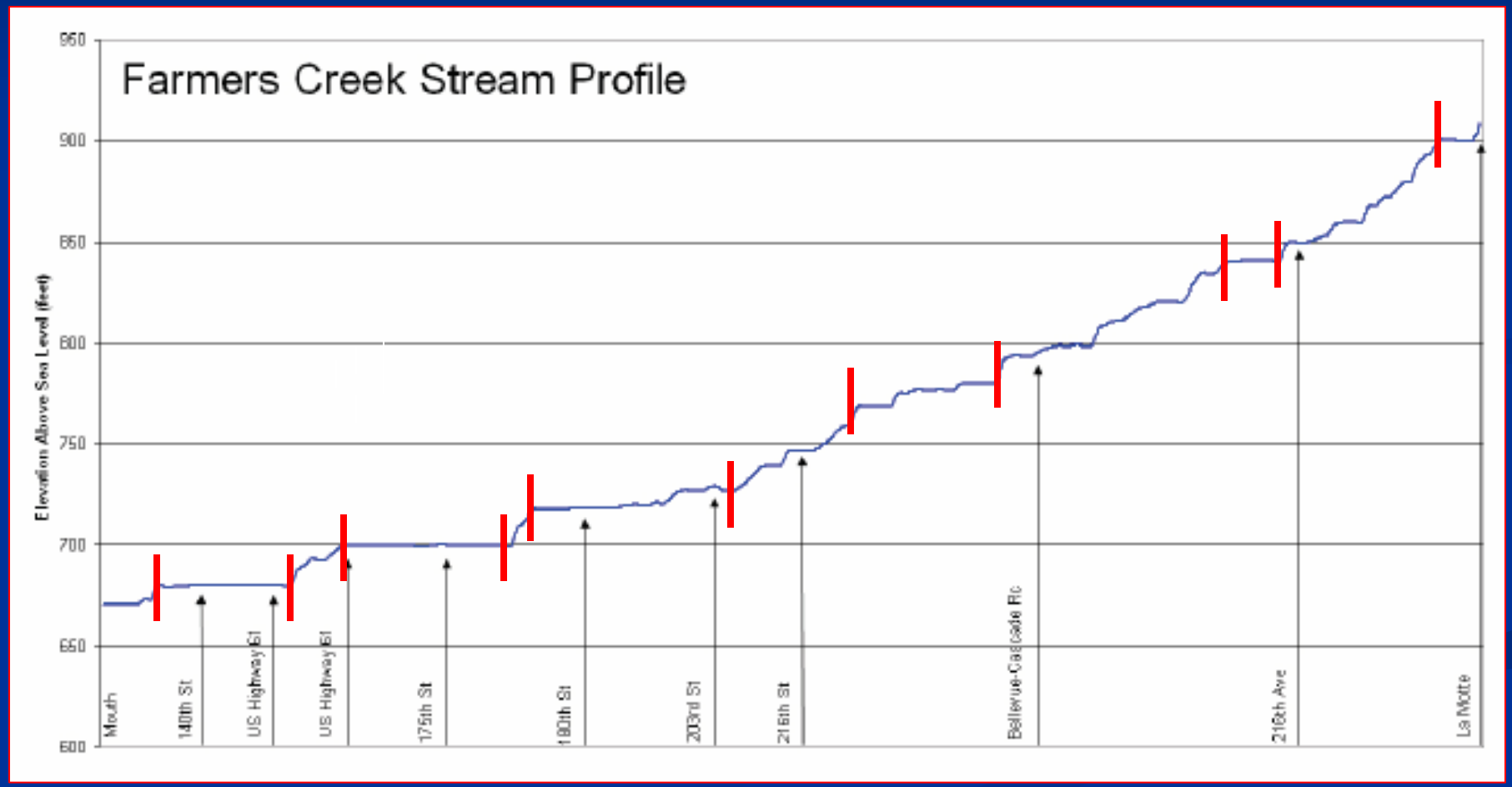
Farmers Creek In-Stream Assessment
Left Adjacent Land Use



Farmers Creek In-Stream Assessment
Right Adjacent Land Use



RASCAL Case Study



RASCAL Case Study

- Flow Estimate
- Substrate
- Channel Condition
- Pool Frequency
- Bank Type
- Bank Height
- Bank Stability
- Bank Material
- Stream Habitat
- Losing Flow
- Riparian Cover
- Riparian Width
- Adjacent Land Use
- Livestock Access
- Canopy Cover
- Hydrologic Variability
- Channel Profile

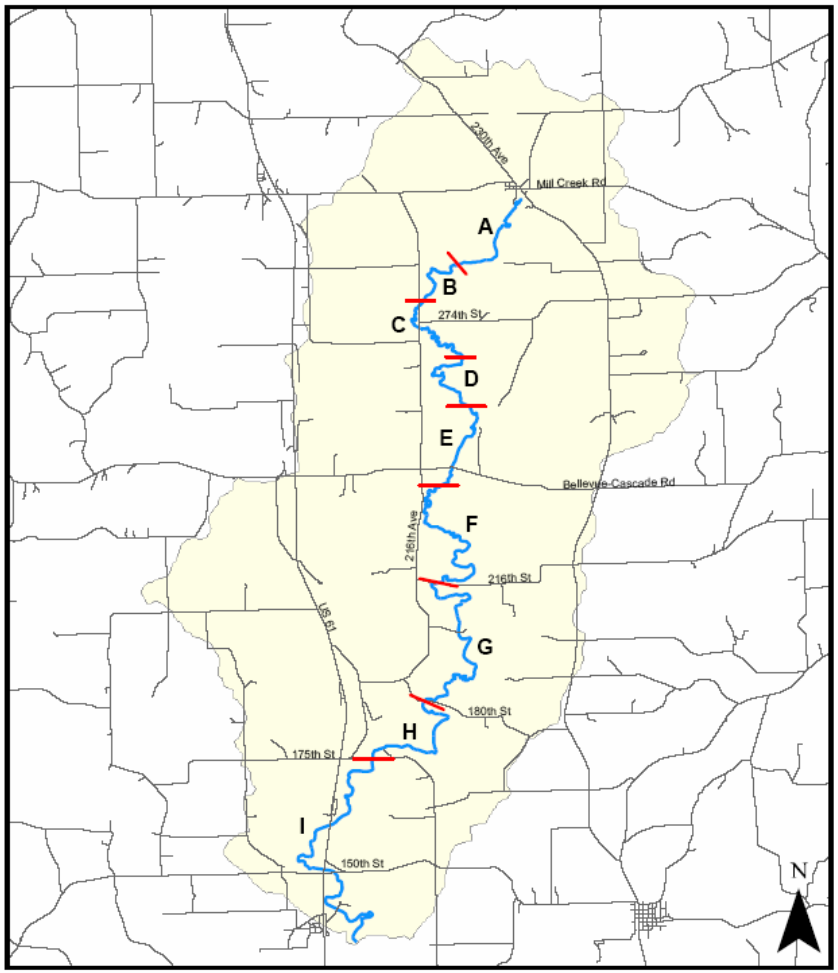
RASCAL Case Study

Farmers Creek RASCAL Segments

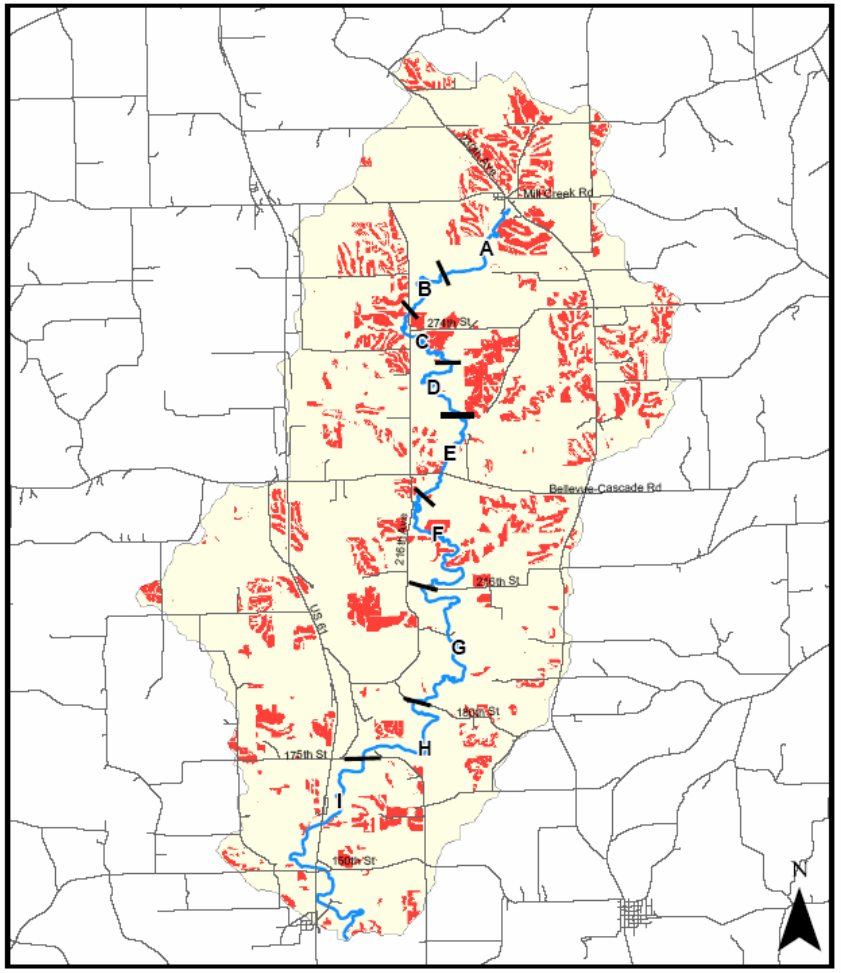
Stream Segment	Streambank Stability	Substrate	Depositional Environment	Adequate Buffers	Livestock Access
A				X	
B	XX	XX			X
C		XX	X	X	
D	X			X	
E	XX			X	X
F	X	XX	X		X
G	X				X
H	XX	XX	X		X
I	X	XX	X	X	

RASCAL Case Study

Farmers Creek In-Stream Assessment
RASCAL Segments



Farmers Creek In-Stream Assessment
RASCAL Segments with High Sheet & Rill Erosion Areas



RASCAL Case Study

Stream Segment B

This segment is characterized by moderately unstable stream banks, the cause of which may be unrestricted livestock access throughout much of this reach. Even though erosion rates in the surrounding cropland areas moderate somewhat, it appears this segment receives significant sediment from on-going rill & sheet erosion exported downstream from segment A. Couple this with a lessening of the channel gradient, the decreased flow rates are not sufficient to effectively transport the existing sediment load through the segment, thus most of the substrate is covered by silt/mud.

Stream Segment C

The stream banks throughout this segment appear to be stable, and livestock access very limited. However, overall soil losses from rill & sheet erosion increase, and there is a general lack of stream corridor vegetative buffers in this segment. The channel gradient continues to decrease, creating an even greater depositional environment, thus covering most of the substrate in this segment with silt & mud.

RASCAL Case Study

	Stream Segment								
BMP	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
Upland Treatment Practices	X		X	X		X		X	X
Stream Corridor Fencing		X			X	X	X	X	
Stream Corridor Vegetative Buffers			X	X	X				X
Stream Bank Stabilization				X	X		X	X	
In-Stream Stabilization Practices		X	X			X		X	X
Storm Water Management Practices	X								

Sediment Budgets

Upper Catfish Creek Sediment Budget

Erosion Source	Amount	Conversion Factor	Total Erosion (tons)	SDR	Sediment Delivered (tons/year)	% of Total Delivered
Rill & Sheet Erosion	9,300 ac.	*	20,809	26%	4,719 **	55%
Gully Erosion						
Cropland	3,537 ac	0.5 tons/ac.	1,769	70%	1,238	14%
Non-cropland						
Grass	1,447 ac.	0.35 tons/ac.	506	90%	455	23%
Timber	3,315 ac.	0.50 tons/ac.	1,658	90%	1,492	
Streambank Erosion						
Stable	4.91 mi.	15 tons/mi.	74	100%	74	
Moderately Stable	4.07 mi.	42 tons/mi.	171	100%	171	8%
Moderately Unstable	1.32 mi.	242 tons/mi.	319	100%	319	
Unstable	0.32 mi.	337 tons/mi.	108	100%	108	

Total Sediment Delivered (tons/year) = 8,576

* varies based upon values entered into GIS using Iowa DNR's notebook computer

** adjusted to relfect sediment trapped in existing structures

Estimating Loading Reductions

Erosion Source	Amount	Sediment Delivered (before)	Sediment Delivered (after)	% Reduction
Rill & Sheet Erosion	9,300 ac.	4,719 t/yr	3,580 t/yr	24%
Gully Erosion				
Cropland	3,537 ac	1,238 t/yr	650 t/yr	47%
Non-cropland				
Grass	1,447 ac.	455 t/yr	300 t/yr	34%
Timber	3,315 ac.	1,492 t/yr	950 t/yr	34%
Streambank Erosion				
Stable	4.91 mi.	74 t/yr	74 t/yr	0%
Moderately Stable	4.07 mi.	171 t/yr	150 t/yr	12%
Moderately Unstable	1.32 mi.	319 t/yr	250 t/yr	22%
Unstable	0.32 mi.	108 t/yr	50 t/yr	54%
	Totals	**8,576 t/yr**	**6,004 t/yr**	**30%**